Remarks

This Amendment is responsive to the Office Action dated March 27, 2003. Claims 1, 5-12, 14, 17, 18 and 20 have been cancelled; claims 2 - 4 and 13 have been allowed; claims 15, 16, and 19-21 require further consideration.

1. The non-final status of the rejection is appreciated.

2. The IDS being considered is noted.

3,4. Claim 7 has been cancelled.

5,6. Claims 1, 5-12, 14, 15, 17 and 18 are rejected as obvious over Dufner et al (Dufner) in view of Wilson. In this rejection, only claim 15 remains. Claim 15 has been amended to be placed in independent form and requires that the diffusion layer has "critical surface energy equal to or less than about 30 dyne per centimeter." Such is not disclosed in Dufner nor Wilson. At page 21 of the specification, it is stated to be "preferable to select a fluoropolymer having a critical surface energy less than or equal to 30 dyne per centimeter. An example of such a diffusion layer includes a porous carbon-Teflon® polytetrafluoroethylene (PTFE) particulate composite having a thickness of about 75-100 microns (0.003 to 0.004 inches), and preferably about 0.0035 inches, with a mass of about 12.1 milligrams per square centimeter." Then, the specification herein goes on to say that the diffusion layers may be "Vulcan XC-72 which is rendered hydrophobic by adding polytetrafluoroethylene (PTFE)...." The only comparable disclosure in Dufner, at the top of column 7, which refers to VULCAN-XC72 and then that it should become hydrophobic by means of FEP-120. The reference to FEP on page 21 of this specification is not a prior art reference that equates FEP to PTFE; furthermore, PTFE is stated to be preferable, and it is the critical surface energy of PTFE which is claimed in claim 15. Since there is no hint of claim 15 in the prior art, reconsideration and allowance thereof over Dufner and Wilson is hereby requested.

7. Claim 8 is cancelled.

8. Claim 19 is rejected as obvious over Dufner et al (Dufner) in view of Wilson and Edlund et al (Edlund). While it is true that Wilson teaches operation of a fuel cell to 2.6 amps per square centimeter for a standard gas diffusion backing, Wilson does not teach that that current density can be achieved in a fuel cell having water transport plates with the reactant gas streams adjacent to the water transport plates. In fact, Wilson does not disclose water channels at all. Since he currents were reported as achieved with the apparatus of Wilson, it is not obvious that such currents can be achieved with apparatus differing significantly from Wilson, such as that set forth in claim 19. Furthermore, the stochiometry referred to in Edlund has no relationship to apparatus of the type described in claim 19, which includes water passages separated by porous plates from the reactant gases themselves. That this is the case is set forth clearly in column 3, in the paragraph between lines 28 and 38. Edlund does not describe much at all about the fuel cell except that it has an anode and a cathode and converts hydrogen and oxygen to heat and electricity. But in the cited paragraph, it is clear that the coolant is not adjacent to water transport plates because it is stated at lines 37 and 38 to be "other non-conducting and non-corrosive liquids including ethylene glycol and propylene glycol". In a case where there is not a porous water management system as set forth in claim 19, the excess air is flowed at high stochiometry in order to force the water out through the air channel, thereby to avoid cathode flooding. Such high stochiometry has nothing to do with the electrical current, other than that a higher current results in more product water which requires more air in order to flush the water out of the fuel cells to avoid cathode flooding.

At the bottom of column 3 of Edlund, the language cited in the rejection, "the air flow rate is 200% to 300% of the stochiometric requirement of oxygen to support the magnitude of electrical current produced by the fuel cell" obviously does not refer to the amount of oxygen required to match with the amount of hydrogen in order to produce the desired current. That flow rate is by definition stochiometric or 100% of stochiometric requirement. Therefore, in order "to

support the magnitude of electrical current produced by the fuel cell" only a stochiometric amount is required, except for the fact that in a system which is capable of using ethylene glycol and propylene glycol in their coolant system, there is no other way to remove product water than by an excess amount of air. Thus, the support referred to at the bottom of column 3 of Edlund must be water removal. Claim 19 is amended to limit the air to 167% stochiometry; thus 200%-300% is not relevant. Since this has no relationship to a fuel cell of the type set forth in claim 19, and since Wilson has not taught achieving 2 amps per centimeter in a fuel cell of the type set forth in claim 19, reconsideration and allowance of claim 19 over all three references is hereby requested.

9. Claims 20 and 21 are rejected as obvious over Wilson in view of Edlund. Claim 20 has been cancelled and claim 21 has been amended to depend from claim 19. Since Edlund can use glycols in the coolant water, the coolant channels are totally isolated from the reactant flow fields. In other words, Edlund does not have water transport plates as required in claim 19, from which claim 21 now depends. Therefore, the stochiometry in Edlund is excessive in order to flow the water out of the air flow fields, since there is no other way to prevent flooding of the cathode. Edlund therefore teaches nothing about a fuel cell of the type set forth in claim 19, from which claim 21 depends. Thus, achieving a current density of 1.5 amps per square centimeter with a stochiometry of about 167% or less is not hinted at in Edlund or Wilson. Therefore, reconsideration and allowance of claim 21 over Wilson and Edlund is hereby respectfully requested.

10. Claim 16 is rejected as obvious over Reiser in view of Wilson. Claim 16 relates to having only one diffusion layer, and is therefore similar to allowed claim 2. Claim 16 has been amended to correct a possible indefiniteness. As amended, it requires that one of the plates have a diffusion layer and the other of the plates not have a diffusion layer. This is not hinted at in Reiser or Wilson. Therefore, reconsideration and allowance of claim 16 is hereby respectfully requested.

11, 12. The allowance of claims 3 and 4 is noted with gratitude.

13. Claims 2 and 13 are presented in independent form and are therefore allowed.

15. Should the foregoing not be persuasive, a telephone call is earnestly solicited.

Respectfully submitted,

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